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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR   | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09 870,534      | 05 31 2001  | Kamalesh K. Srivastava | FIS920000349US1     | 1332             |

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INTERNATIONAL BUSINESS MACHINES CORPORATION  
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[REDACTED] EXAMINER

UMEZ ERONINI, LYNETTE T

[REDACTED] ART UNIT [REDACTED] PAPER NUMBER

1765

DATE MAILED: 10/23/2002

17

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                                     |                                   |
|------------------------------|-------------------------------------|-----------------------------------|
| <b>Office Action Summary</b> | Application No.<br>09/870,534       | Applicant(s)<br>SRIVASTAVA ET AL. |
|                              | Examiner<br>Lynette T. Umez-Eronini | Art Unit<br>1765                  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on \_\_\_\_ .
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_ is/are allowed.
- 6) Claim(s) 1-15 is/are rejected.
- 7) Claim(s) \_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on \_\_\_\_ is: a) approved b) disapproved by the Examiner.  
 If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some \* c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_ .
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                            | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s) ____    |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ | 6) <input type="checkbox"/> Other   |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
2. Claims 1, 3, 4, 10, and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, line 5;

In claim 3, line 2;

In claim 4, line 2;

In claim 10, line 3; and

In claim 11, line 3, "predetermined" is indefinite because it reads on a process conducted prior to the performing the steps of the claimed invention, hence renders the present process claims unclear in meaning and scope.

It is suggested that "predetermined" be deleted.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 4, and 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erk et al. (US 5,340,437) in view of Barbee et al. (US 5,445,705).

Erk teaches a method comprising the steps of:

immersing an article into a tank of etchant (column 7, lines 13-17);  
rotating semiconductor (articles) wafers at less than 5 rpm for a period of about 1 to 10 minutes (column 4, lines 19-26; column 7, lines 17-24 and column 8, lines 30-32);  
and

removing the article from the tank of etchant (column 8, lines 38-42), as **in claim 1, 4, and 5.**

Erk differs in failing to teach the article contains a film, **in claim 1**; and the film is a metallic film and a non-metallic film, respectively **in claims 6 and 7.**

Barbee teaches a workpiece **20**, such as a semiconductor wafer comprises one or more film layers on a surface thereof, the film layers are either patterned or unpatterned (column 5, lines 42-50; column 7, lines 67 - column 8, line 7) and “ . . . the removal of a conducting or dielectric film from the etched work piece **20** . . . ” (column 6, lines 63-64), further reads on the article containing a film and the film being either metallic and non-metallic, respectively **in claims 1, 6, and 7.**

Since Erk and Barbee respectively uses the same steps and film layer as those of the claimed invention, then combining Erk and Barbee would inherently result in a method of improving the uniformity of etching of a film on an article. Hence, it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Erk by using an article containing a film as taught by Barbee for the

purpose monitoring an etching condition of a workpiece being etched which does not interfere with the impingement of an etchant upon a workpiece (Barbee, column 3, lines 17-21).

5. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erk ('US '437) in view of Barbee (US '705) as applied to claim 1 above, and further in view of Takeshi et al. (English Abstract of JP 9115977 A2).

Erk in view of Barbee differs in failing to teach the step of rotating comprises sequentially rotating the article, **in claims 2 and 3**; and

sequentially rotating comprises rotating the article a predetermined amount but less than a complete rotation and repeating the steps of rotating and etching for a predetermined amount of time, **in claim 3**.

It is well known in the art that a complete rotation is 360 degrees. Takeshi teaches the steps of setting a fixed angular velocity so that the total angle of rotation becomes less than 360 degrees [0025 and 0028], which reads on rotating the article a predetermined amount but less than a complete rotation. Takeshi also teaches repeating the step of rotating and etching for a predetermined amount of time [0030].

It would have been obvious to modify Erk in view of Barbee by using Takeshi's step of sequentially rotating an article for a predetermined amount but less than a complete rotation, and repeating the steps of rotating and etching for a predetermined amount of time for the purpose of improving the method of detecting defects in semiconductor processing.

6. Claims 8, 11, 12, 14, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erk ('US 437) in view of Barbee (US '705).

Erk teaches a method comprising the steps of:

immersing a semiconductor into a tank of etchant (column 7, lines 13-17);  
rotating semiconductor wafers at less than 5 rpm for a period of about 1 to 10 minutes (column 4, lines 19-26; column 7, lines 17-24 and column 8, lines 30-32); and  
removing the semiconductor from the tank of etchant (column 8, lines 38-42), as

**in claims 8, 11, and 12.**

Erk differs in failing to teach the semiconductor contains a film, **in claim 8;** and the film is a metallic film and a non-metallic film, respectively **in claims 14 and 15.**

Barbee teaches a workpiece **20**, such as a semiconductor wafer comprises one or more film layers on a surface thereof, the film layers are either patterned or unpatterned (column 5, lines 42-50; column 7, lines 67 - column 8, line 7) and " . . . the removal of a conducting or dielectric film from the etched work piece **20** . . ." (column 6, lines 63-64), which further reads on the semiconductor containing a film and the film being either metallic or non-metallic, as **in claims 8, 14, and 15.**

Since Erk and Barbee respectively uses the same steps and film layer as those of the claimed invention, then combining Erk and Barbee would inherently result in a method of improving the uniformity of etching of a film on a semiconductor wafer. Hence, it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Erk by using an article containing a film as taught by Barbee for the purpose monitoring an etching condition of a workpiece being etched

which does not interfere with the impingement of an etchant upon a workpiece (Barbee, column 3, lines 17-21).

7. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erk (US '437) in view of Barbee (705) as applied to claim 8 above, and further in view of Takeshi (English translation of JP '977 A2).

Erk in view of Barbee differs in failing to teach the step of rotating comprises sequentially rotating the semiconductor, **in claims 9 and 10**; and

sequentially rotating comprises rotating the semiconductor a predetermined amount but less than a complete rotation, and repeating the steps of rotating and etching for a predetermined amount of time, **in claim 10**.

It is well known in the art that a complete rotation is 360 degrees. Takeshi teaches the steps of etching a semiconductor by setting a fixed angular velocity so that the total angle of rotation becomes less than 360 degrees and etching for a fixed time [0025 and 0028], which reads on rotating the article a predetermined amount but less than a complete rotation. Takeshi also teaches repeating the step of rotating and etching for a predetermined amount of time [0030].

It would have been obvious to modify Erk in view of Barbee by using Takeshi's step of sequentially rotating an article for the purpose of improving the method of detecting defects in semiconductor processing.

8. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Erk (US '437) in view of Barbee (705) as applied to claim 8 above, and further in view of applicant's admitted prior art.

Erk in view of Barbee differs in failing to teach the semiconductor wafer further comprises a plurality of solder bumps on the film.

The admitted prior art is relied upon to show solder bumps are formed on metal pads that are electrically connected into a chip circuit and many chips are formed on each wafer, which reads on, the semiconductor wafer further comprises a plurality of solder bumps on the film (Background of the Invention, page 2, lines 5-18).

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Erk in view of Barbee by using a semiconductor wafer that comprises a plurality of solder bumps on a film, as shown in applicant's admitted prior art for the purpose of improving the method of placing more circuits on a chip.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703-308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703-972-9310 for regular communications and 703-972-9311 for After Final communications.

*Dynette T. Umey-Esunini*

Itue

October 18, 2002